THE FIRST REPORT OF ZUPHIINI (COLEOPTERA: CARABIDAE) FROM NEW CALEDONIA; A NEW GENUS AND TWO NEW SPECIES.

JONG KYUN PARK AND KIPLING W. WILL

PARK, J.K. & Will, K.W. 2008 04 30. The first report of Zuphiini (Coleoptera: Carabidae) from New Caledonia; a new genus and two new species. *Memoirs of the Queensland Museum* **52**(2): 99–104. Brisbane. ISSN 0079-8835.

A new zuphiine carabid beetle genus, *Atongolium* gen. nov., including *Atongolium mirabile* sp. nov. (type species) and *A. moorei* sp. nov., is described. The type locality for both new species is Ningua Reserve, New Caledonia. These are the first Zuphiini recorded from New Caledonia. They are very divergent from all known zuphiines in having the anterior and posterior corners of the pronotum with lobe-like protuberances, a field of spatulate setae covering most of the body and a coating of environmental patina. Their coating of dirt renders them very cryptic. ❐ *Systematics, species key, crypsis, New Caledonia, Coleoptera, Carabidae, Zuphiini.*

Jong Kyun Park, Department of Applied Biology, Sangju National University, Sangju 742-711, Korea; Kipling W. Will, 137 Mulford Hall, ESPM Department - Organisms & Environment Division, University of California Berkeley, CA 94720. USA. (email: kiplingw@nature.berkeley.edu); *23 February 2007.*

Worldwide there are 320 species belonging to 21 genera of the tribe Zuphiini Bonelli (Lorenz, 2005a, b). Many zuphiine genera have been described and revised that are found in the region adjacent to New Caledonia (Baehr, 1984, 1985, 1986, 2004) and distributed in the Oriental region (e.g. Baehr, 1997, 1998). However, this tribe has not been previously reported from New Caledonia. Works on New Caledonian Carabidae are limited, e.g. (Perroud & Montrouzier, 1864; Fauvel, 1882a, b, e, 1903; Jeannel, 1944; Heller, 1916; Everard, 1936), and there has never been a comprehensive faunal work for the group on the island. As a result of recent collecting efforts by the Queensland Museum at numerous sites in New Caledonia there are many new records and taxa being discovered. In this contribution we report the first collection of Zuphiini for New Caledonia and describe these extremely morphologically divergence taxa.

METHODS

Dissection methods for male genitalia, measurements and descriptive terms follow Will (2002). Images were taken using a Mieropties XLT digital imaging system. Abbreviations used are as follows: L - length of body (from labrum to apex of elytra), LH - length of head, WH - width of head, LP - length of pronotum, WP - width of pronotum, LE - length of elytra, WE - widest width of elytra, LAI - length of anterior lobe of prontum, LPI - length of posterior lobe, LA1 - length of antennomere 1, WA1 - width of antennomere 1.

Museum codens used herein: QM, Queensland Museum, Brisbane; MNHN, Muséum National d'Histoire Naturelle, Paris.

TAXONOMY

Atongolium gen. nov.

TYPE SPECIES. *Atongolium mirabile* sp. nov.

ETYMOLOGY. The generic name is a latinised arbitrary combination of letters created by B.P. Moore during his initial study of specimens in the QM. Neutral gender.

DIAGNOSIS. This is the only genus of Zuphiini known from New Caledonia and can readily be distinguished from all other genera in the tribe by a combination of the following, projecting lobes at the anterior and posterior angles of pronotom (Figs 1, 2), dorsal surface of body with spatulate setae, enlarged antennomere 1, elytral interval 5 carinate and 7 tuberculate and apex of elytron acuminate to dentiform.

DESCRIPTION. Colour of integument of cleaned specimens (environmental patina removed) dark red-brown; antennae, legs and palpi concolourous with body to slightly lighter. General body-form (Figs 1, 2) slightly dorso-ventrally depressed, slender and long. Body with spatulate setae of different lengths sparsely distributed over most of dorsal surface, more densely on legs

and near margins of elytra and pronotum. Dorsal surface naturally coated with an environmental patina, apparently of soil and exudates. *Head.* Form elongate, parallel-sided. Eyes small, more or less round, little protruding. Clypeus trapezoidal, anterior and lateral margins distinctly elevated with long seta on either side. Region between antennae near antennal base with large, deep groove. Frons smooth, slightly convex. Labrum almost rectangular with 6 marginal setae, the inner 4 half as long as outer 2. Mandible long and slender, slightly curved at apex. Mentum wide with distinct paramedial pits, tooth simple. Maxillary palpus long, fusiform; terminal and basal seg-ment equal in length. Labial palpus elongate. Total length of antennae almost attaining elytra humeri, antennomeres pubescent, antennomere 1 asymmetrically swollen, distinctly longer and wider than other antennomeres. *Pronotum.* Slightly wider than head. Anterior and posterior angles with long, stout lobular protuberances, anterior lobes shorter and thicker than posterior pair. *Elytra.* Ovoid elongate and slightly convex, humeri sharply and obliquely sloped with inclination of about 45°, widest at midpoint. Eight elytral intervals, striae marked by row of punctures. Apex of elytra ranging from sinuate to featuring prominent, broad denticles.

TABLE 1. Measurements of types of *Atongolium mirabile* sp. nov. (mm).

Types	WH	LH	WP	LP	WE	LE	LAI	LPI
Holotype	0.90	1.44	1.20	1.30	2.00	3.45	0.12	0.22
Paratype (Ningua)	0.90	1.52	1.18	1.36	2.00	3.45	0.12	0.24
Paratype (Col d'Amieu)	1.00	1.62	1.22	1.40	2.20	3.50	0.10	0.20

TABLE 2. Measurements of types of *Atongolium moorei* sp. nov. (mm).

Types	WH	LH	WP	LP	WE	LE	LAI	LPI
Holotype	0.76	1.22	0.88	0.88	1.74	2.70	0.10	0.20
Paratype (Ningua)	0.78	1.26	0.86	0.84	1.77	2.67	0.10	0.20
Paratype (Col d'Amieu)	0.74	1.18	0.78	0.92	1.55	2.57	0.10	0.20

KEY TO ADULTS OF *ATONGOLIUM*

1. Lateral pronotum between pronotal lobes clearly margined and with a continuous carina from apex to base. Antennomere 1 fairly long and wide (HL/LA1: 2.88, WH/WA1: 6.43). Length of body >6.0mm ..... *Atongolium mirabile* sp. nov. (Fig. 1A)
2. Lateral pronotum between pronotal lobes not margined, smoothly rounded and without carina. Antennomere 1 very long and wide (HL/LA1 :1.93, WH/WA1: 3.30). Length of body <6.0mm ..... *Atongolium moorei* sp. nov. (Fig. 1B).

Atongolium mirabile sp. nov.
(Figs 1A, 2, 3A-F, 4)

ETYMOLOGY. From the Latin *mirabile*, meaning wonderful or extraordinary.

MATERIAL. HOLOTYPE, ♂: NEW CALEDONIA, 21°45'S × 166° 09'E, Ningua Reserve Camp, 1100m, 12-13.xi.2001, C. Burwell & G. Monteith, pyrethrum, trees & logs, 8639 (MNHN). PARATYPES(2 ♂♂3 ♀♀): 1♀, same data as holotype (QM); 1♂, same locality, 29.i.2002, G. Monteith, pyrethrum, tree trunks, 8897 (QM); 1♀, 21° 37' S × 165°49'E, Col d'Amieu, west slope, 470m, 29.ix.2004, G. Monteith, pyrethrum, trees & logs, 11667 (QM); 1♀, Riviere des Pirogues (headwaters, 350–400m), 22.v.1984, G. Monteith & D. Cook. (QM); 1♂, Mt. Koghis, montane forest, 500m, 22-24.v.1987, N.I. Platnick & R.J. Raven. (MNHN).

DESCRIPTION. Total length of holotype 6.30 mm, greatest width 2.00 mm. General body-form as in Figs 1A, 2. Measurements as in Table 1. *Antennae.* Antennomere 1 longer and distinctly wider than all other antennomeres, 3.50 × as wide and 5.60 × as long as antennomere 2. *Pronotum.* Longer than wide (LP/PW: 1.08), ovoid and convergent to base, greatest width slightly broader than head. Lobes at anterior angles shorter (0.12mm) and relatively thicker than lobes at posterior angles (length 0.22mm). Lateral margin between lobes with prominent continuous carina. *Elytra.* Intervals 1, 3 and 5 with row of regularly spaced setae, setae longer than those of intervals 2, 4, 6 and 7. Intervals 2, 4, 6 and 7 with scattered setae. Interval 3 near apex with 2 tubercles, apical-01/3. Intervals 4 and 5 anastomosing near base. Interval 5 carinate for most of its length. Intervals 7-8 with 12 tubercles surmounted with umbilicate punctures. Striae well impressed and punctate. *Legs.* Protarsi of male slender, not expanded, without ventrally adhesive hairs, tarsomere 1 ventrally with 7 stout setae medially and laterally, tarsomeres 2 to 4 with short to long setae, setae longer near apex, tarsomere 5 with 3 moderately long setae. Inner seta of tarsomere 4 ventro-apically positioned, long and translucent. *Male genitalia.* Genital ring wide and long. Median lobe (Fig.

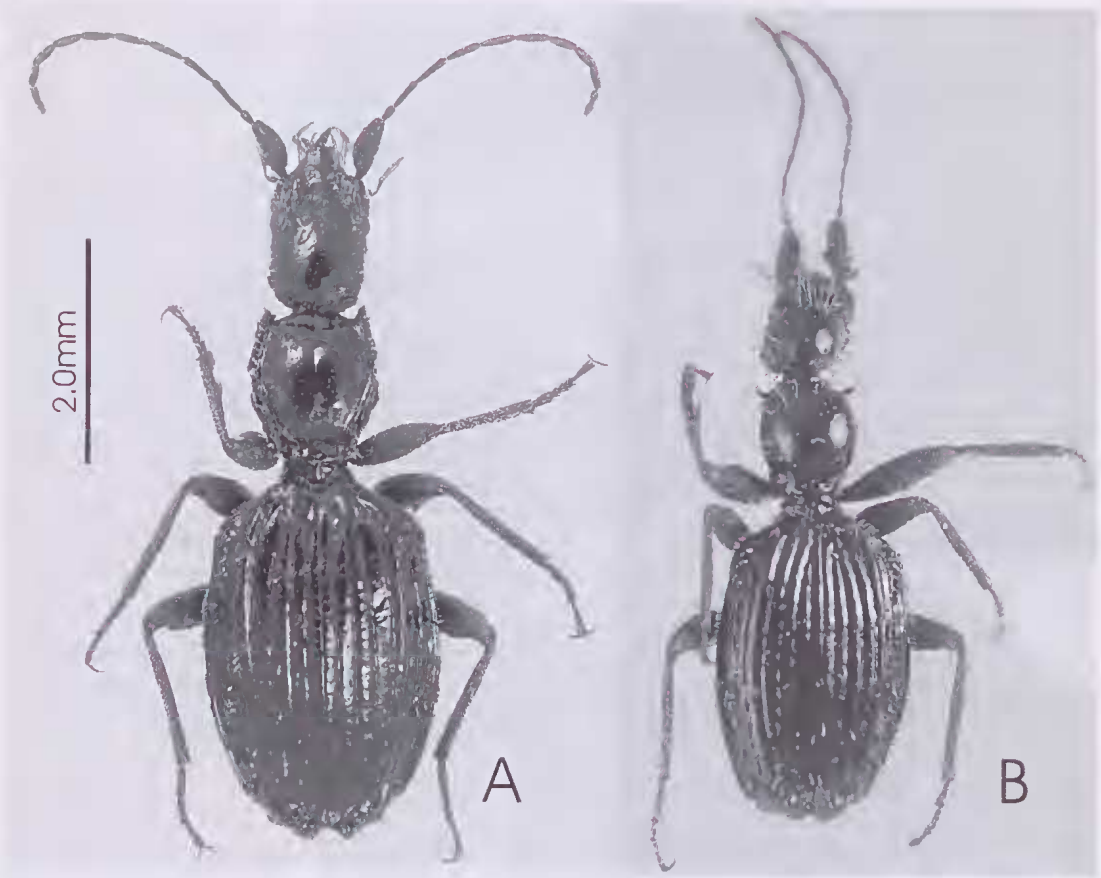

FIG. 1. *Atongolium* species, dorsal view of cleaned specimens. A, *Atongolium mirabile* sp.nov.; B, *Atongolium moorei* sp.nov.

3A-D) of aedeagus slightly twisted to left in apical third, ostium deflected slightly to left, no structures apparent on endophallus in cleared specimen. Tip from level of ostium to apex bent to right of midline, tip beyond ostium short, broad, rounded at apex. Left paramere wide and elongate, right paramere slightly twisted and more slender. *Female genitalia*. Gonocoxite-1 with row of six stout setae along apicoventral margin, gonocoxite-2 with two nematiform setae in apical furrow, two ventolateral and one dorsomedial ensiform setae.

Atongolium moorei sp. nov.
(Figs 1B, 3G-K, 4)

ETYMOLOGY. Noun in the genitive case. In honour of Barry P. Moore, who first recognised this remarkable group among the material in the Queensland Museum and for his contributions to Australian entomology.

MATERIAL. HOLOTYPE, ♂: NEW CALEDONIA, 21°45' S × 166° 09' E, Ningua Reserve Camp, 1100m, 12-13.xi.2001. C. Burwell & G. Monteith, pyrethrum, trees & logs. 8639 (MNHN). PARATYPES (2♀♀): 1♀, NEW CALEDONIA, 21° 45' S × 166° 09' E, Ningua, nr summit, rainforest, 1300m, 13.xi.2001, G. Monteith, Berlesate No.1052, sieved litter (QM); 1♀, 21° 37' S × 165° 49'E, Col d'Amieu, west slope, 470m, 25.xi.2003, G.Monteith, pyrethrum, trees & logs, 11427 (QM).

DESCRIPTION. Total length of holotype 5.20mm, greatest width 1.74mm. General body-form as in Fig. 1B. Measurements as in Table 2. *Antennae*. Antennomere 1 longer and distinctly wider than all other antenomeres, 4.60 × as wide and 4.85 × as long as antennomere 2. *Pronotum*. Oval, sides arcuate and slightly narrower at base, greatest length and width equal (PL/PW: 1), wider than head. Anterior angles with lobes shorter (0.10mm) and relatively slightly thicker than lobes at posterior angles (length 0.20mm). Lateral margin between lobes low, smoothly rounded. *Elytra*. Intervals convex, interval 5 carinate near base, intervals 7-8

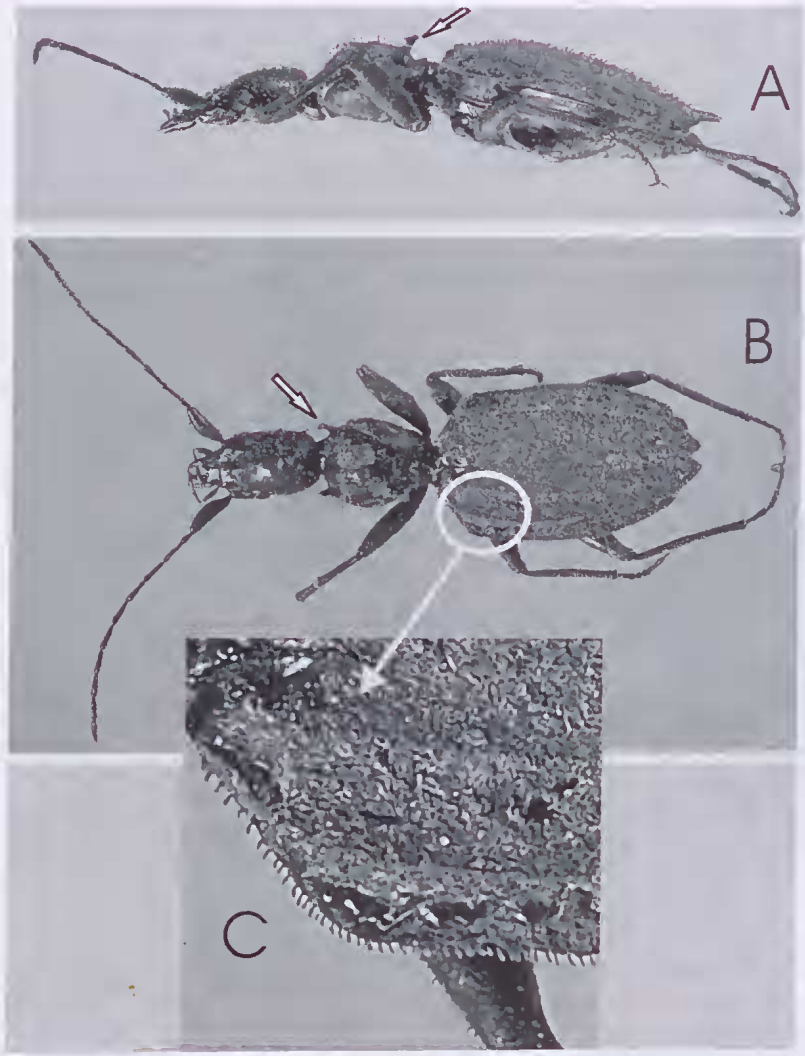

FIG. 2. *Atongolium mirabile*, uncleaned specimen with environmental patina intact. A, left lateral view; B, dorsal view; C, detail of humeral region of elytron showing environmental patina.

with 11 tubercles surmounted with umbilicate punctures. Interval 3 with 1 such tubercle near apex. Intervals 1, 3 and 5 with row of regularly spaced setae, setae longer than those of intervals 2, 4, 6 and 7. Intervals 2, 4, 6 and 7 with scattered setae. Striae marked by rows of punctures. *Male genitalia* (Fig. 3G-K). Genital ring wide and long. Median lobe of aedeagus notably twisted to right in apical third, ostium deflected to right, no structures apparent on endophallus in cleared specimens. Tip from level of ostium to apex slightly sinuate, tip beyond ostium long, narrow obliquely rounded at apex. Left paramere wide and elongate, right paramere long and slender. *Female genitalia.* Not examined.

DISCUSSION

RELATIONSHIPS. Relatively little is certain in regards to the phylogenetic relationships of subtribal and generic groups of Zuphiini. Four subtribes are known from the Austral-Asian region, but none of the included taxa appear to be particularly similar to *Atongolium*. Peculiarities of the antennae in *Atongolium* seem to distinguish this genus from Lelcupidiina, which lack the enlarged first antennomere, and Patriziina, which have much shorter antennae. Both general body form and the pluri-striate elytra in Planetina, as compared to the very distinctive form of the elytra in *Atongolium*, suggest that these are long separated taxa. Given the lack of obvious synapomorphies we place *Atongolium* as incerta sedis in Zuphiini as a highly apotypic form.

DISTRIBUTION AND BIOLOGY. These curious Carabidae are quite rare. Six specimens of *A. mirabile* and three of *A. moorei* are now known from just five localities in New Caledonia (Fig. 4), all collected by Queensland Museum surveys. These are wet rainforest sites at moderate to high altitude (350-1300m) in the southern half of the island. The two species are sympatric at two localities (Col d'Amieu and Ningua). Ningua Reserve is the type locality for both species and the exact collection site is an area at 21°44'46"S X 166°09'16"E where the highest part of the mining road traverses the lower edge of the rainforest just southeast of the summit of the mountain. The larger species, *A. mirabile*, is found at all known localities while the smaller

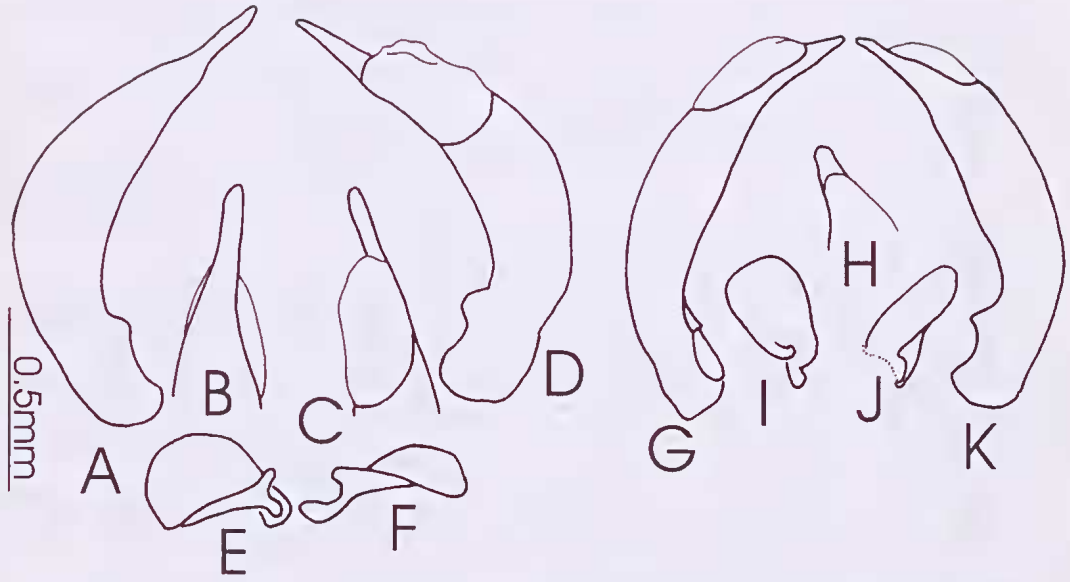

FIG. 3. *Atongolium* species, male genitalia. A-F, *A. mirabile*. A, median lobe, left lateral view; B, median lobe, ventral view of tip; C, median lobe, dorsal view of tip; E, left paramere; F, right paramere. G-K, *A. moorei*. G, median lobe, left lateral view; H, median lobe, ventral view of tip; I, left paramere; J, right paramere; K, median lobe, right lateral view.

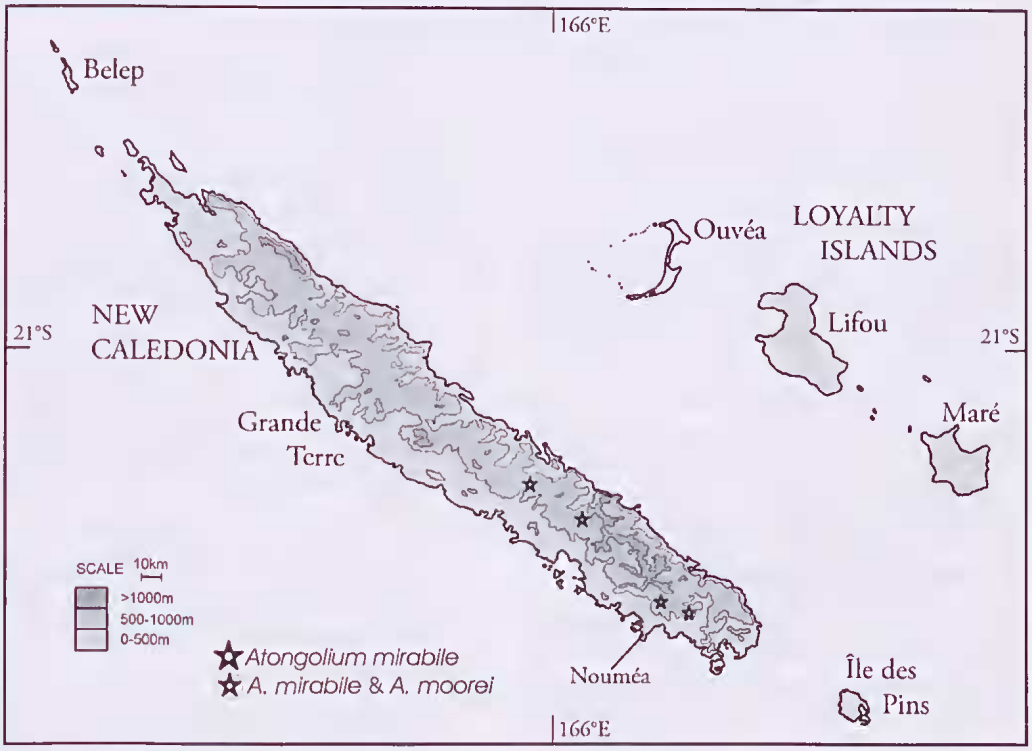

FIG. 4. New Caledonia, showing collecting sites for *Atongolium* species.

species, *A. moorei*, occurs only in the northern part of the generic range. The apparent restriction of the genus to the southern half of the island is likely real, as the Queensland Museum has intensively surveyed numerous similar sites in the northern half of the island using the same collecting methods.

No specimens have been observed in life but some speculation can be made on their microhabitat from the collection data. Two specimens have no collection method recorded. One (*A. moorei)* was from Berlese extraction of a sample of sifted ground litter. This is clearly not a common situation for the genus because the Queensland Museum has processed hundreds of New Caledonian litter samples over the years. Six specimens (two *A. moorei* and four *A. mirabile*) were from four separate pyrethrum spraying events that targeted the basal trunks of standing trees and the sides of fallen logs. At higher altitudes these surface are commonly covered with a dense layer of moss, liverworts and other epiphytes. It would seem that the normal habitat for *Atongolium* may be within the interstices of this epiphytic growth or the decayed wood/ bark surface itself. In this situation the extreme crypsis afforded by their surface coating may allow them to act as sit-and-wait predators on other small arthropods in the same habitat, while providing protection from larger, visual predators. This microhabitat differs from that of most Zuphiini, which is on the ground surface.

ACKNOWLEDGEMENTS

We thank Geoff Monteith for bringing these fine animals to our attention, providing the loan of material from the Queensland Museum for this study and the detailed information on distribution and biology.

LITERATURE CITED

BAEHR, M. 1984. Revision der australischen Zuphiine 1. Gattung *Acrogenys* Macleay (Insecta, Coleoptera, Carabidae). Spixiana 7 (2): 115-134.

1985. Revision of the Australian Zuphiinae 4. The genus *Parazuphium* Jeannel (Insecta, Coleoptera, Carabidae). Spixiana 8 (3): 295-321.

1986. Revision of the Australian Zuphiinae 5. The genus *Zuphium* Latreille (Insecta, Coleoptera, Carabidae). Spixiana 9 (1): 1-23.

1987. The Indo-Australian species of the Zuphiine genus *Agastus* Schmidt-Gobel (Insecta, Coleoptera, Carabidae). Spixiana 10 (1): 1-11.

1997. Leleupidiini from the Oriental region. 1. New species of the genus *Colasidia* Basilewsky (Insecta, Coleoptera, Zuphiinae). Revue Suisse de Zoologie 104 (3): 611-659.

1998. Leleupidiini from the Oriental region. 2. The genus *Gunvorita* Landin (Insecta, Coleoptera, Carabidae, Zuphiinae). Revue Suisse de Zoologie 105 (2): 261-318.

2004. *Colasidia wau*, a new leleupidiine species from Papua New Guinea (Insecta, Coleoptera, Carabidae). Revue Suisse de Zoologie 111(1): 175-181.

EVERARD B.B. 1936. A new species of *Xanthophaea* (Coleoptera: Carabidae) from New Caledonia. Entomologist's Monthly Magazine 72 (3rd series-22): 222-224.

FAUVEL, A. 1882a. Les Coléoptères de la Nouvelle-Calédonie et dépendances avec descriptions, notes et synonymies nouvelles. Revue d'Entomologie 1: 217-236.

1882b. Les Coléoptères de la Nouvelle-Calédonie et dépendances avec descriptions, notes et synonymies nouvelles. Revue d'Entomologie 1: 241-261.

1882c. Les Coléoptères de la Nouvelle-Calédonie et dépendances avec descriptions, notes et synonymies nouvelles. Revue d'Entomologie 1: 265-274.

1903. Faune analytique des Coléoptères de la Nouvelle-Calédonie. Revue d'Entomologie 22: 203-378.

HELLER, K.M. 1916. Nova Caledonia. 12. Die Kafer von neu-Caledonien und den benaehbarten inselgruppen. A. Zoologie II. L. III 237-271, figs. 1-12.

JEANNEL, R. 1944. Un carabique nouveau de la Nouvelle-Caledonie. Revue francaise Entomologie 10: 84-86.

LORENZ, W. 2005a. A systematic list of extant ground beetles of the world (Coleoptera "Geadephaga": Trachypachidae and Carabidae, incl. Paussinae, Cicindelinae, Rhysodinae). (Published by author: Tutzing).

2005b. A directory of the scientific names of ground beetles (Coleoptera "Geadephaga": Trachypachidae and Carabidae, incl. Paussinae, Cicindelinae, Rhysodinae). (Published by author: Tutzing).

PERROUD, B. P. & MONTROUZIER, X. 1864. Essai sur la faune entomologique de Kanala (Novelle-Caledonie) et description de quelque espèces novelles ou peu connues. Annales de la Société Linnéenne de Lyon (NS) 11: 11: 46-257 + 1 pl.

WILL, K. W. 2002. Revision of the new world abariform genera *Neotalus* n. gen. and *Abaris* Dejean (Coleoptera: Carabidae: Pterostichini (Auctorum). Annals of the Carnegie Museum of National History 71: 143-213.